

This event covers the fields of physical and geological oceanography.

Resources are limited to a single sheet of paper 8.5x 11 inches and a calculator of any type.

No other student resources are permitted.

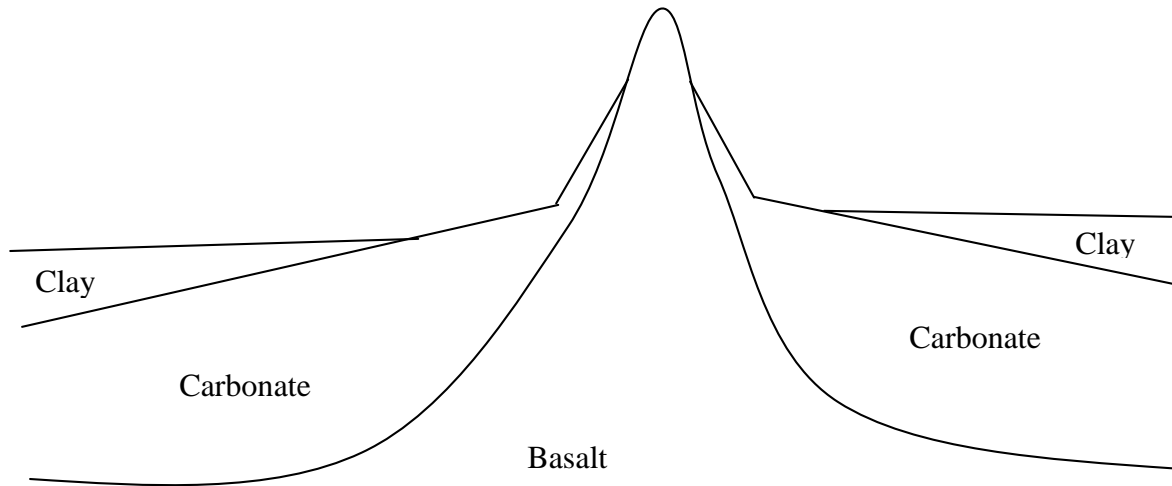
The test is 50 minutes in length.

**DON'T PANIC!!!**

My tests tend to be very hard, with scores ranging from 20-80%.

Good luck!

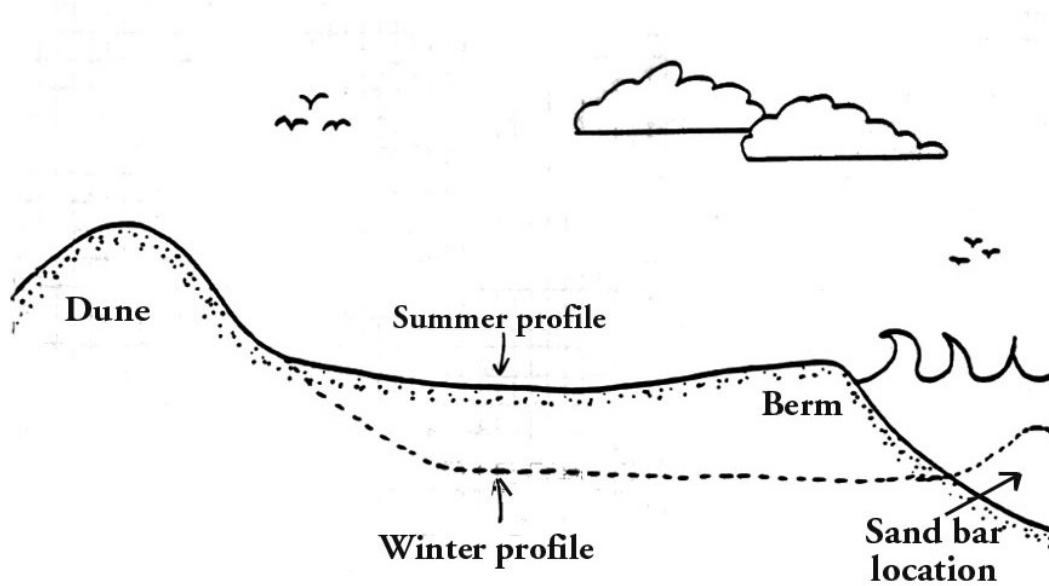


**A. Sedimentary processes (32 points)**

The plot above shows a schematic cross-section of the rock in the Atlantic. The following three questions are based on this plot. Explain

1. What sorts of particles make up carbonate sediments? (8 points)
2. Why the blanket of sediment gets thicker as one moves away from the center of the plot. (8 points)

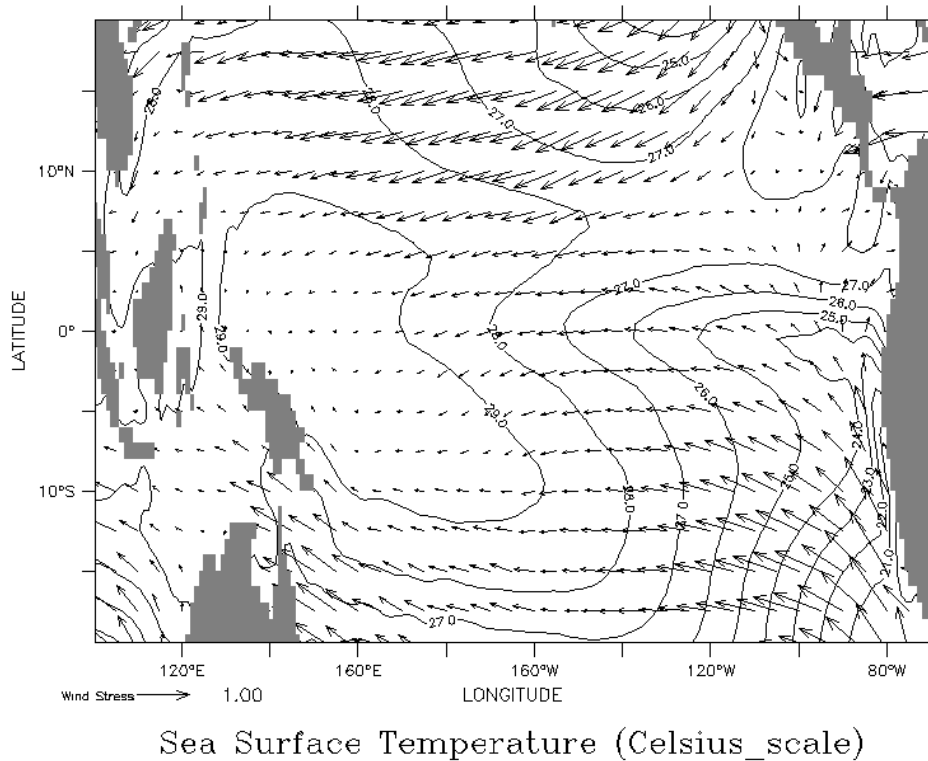
3. Why carbonate sediments are covered up with clay at the edges of the plot. (8 points)



4. The picture above show summer and winter beach profiles. Explain why these profiles are different. (8 points)

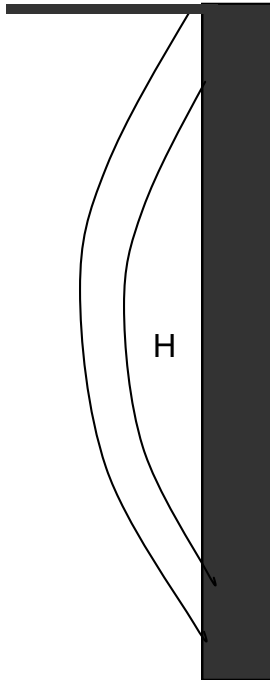
**B. Seawater and its properties (short answer, 3 points each)**

1. Why is the sea salty (where does the salt come from)?
  
  
  
  
  
  
  
  
  
  
2. How is the pH of seawater likely to change as more carbon dioxide is put into the atmosphere?
  
  
  
  
  
  
  
  
  
  
3. Why does the apparent color of a fish change as it swims deeper into the water column?
  
  
  
  
  
  
  
  
  
  
4. How does a CTD sensor measure salinity?
  
  
  
  
  
  
  
  
  
  
5. Why do oceanographers use potential temperature to look at the ocean?
  
  
  
  
  
  
  
  
  
  
6. Name one major nutrient in seawater.

**C. Physics of ocean circulation**

1. The plot above shows winds and sea surface temperatures along the equator. Why is the sea surface temperature coldest right along the equator? (10 points)

2. Would the Sverdrup transport be northward or southward at 8S, 160E? Why? (5 points)

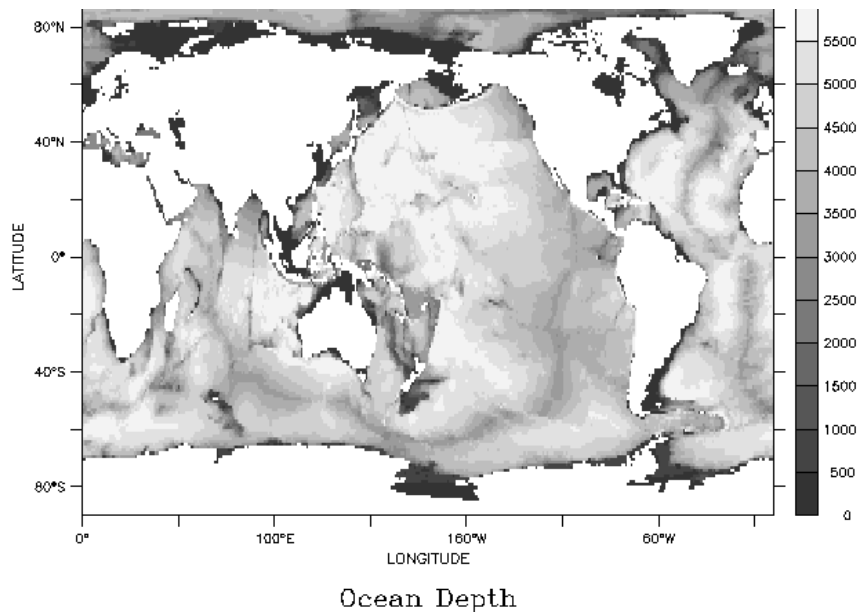


Suppose the moon has pulled a tidal bulge up against the edge of a continent in the northern hemisphere as shown at left.

3. A tidal bulge is not in geostrophic balance, but it is “trying” to come into geostrophic balance. Draw arrows showing the geostrophic flow associated with this high. (5 points)

4. How will the geostrophic flow cause the height of the bulge to change? (5 points) What does this tell you about how the earth’s rotation explains the patterns of tides on earth? (5 points)

#### D. Current ID (10 points)



On the map above, draw arrows showing the location and direction of the following currents. 1. Somali 2. Kuroshio 3. East Greenland 4. Falklands 5. Antarctic Circumpolar

**E. Fill in the blanks (10 points)**

1. A \_\_\_\_\_ surface gravity wave has orbital motions that are essentially circular.
2. A \_\_\_\_\_ surface gravity wave has orbital motions that move essentially from side to side.
3. A \_\_\_\_\_ is a flat topped submarine hill more than 1.5 km in height.
4. Construction of a pier in the path of the longshore current will cause the beach to \_\_\_\_\_ downcurrent of the pier.
5. \_\_\_\_\_ can be triggered by a burst of westerly winds along the equator in the western Pacific.
6. The \_\_\_\_\_ is an atmospheric circulation that develops during the afternoons when the land warms up more than the ocean.
7. The \_\_\_\_\_ is a water mass found in the Atlantic, Pacific, and Indian Oceans which is associated with a mid-depth minimum in salinity.
8. The \_\_\_\_\_ is a water mass found in the North Atlantic ocean that is associated with a mid-depth maximum in salinity.
9. A \_\_\_\_\_ is a region where there is a vertical gradient in density.
10. If a tide has a period of 12.4 hours, it is most likely caused by the \_\_\_\_\_.